ACTA SOCIETATIS
BOTANICORUM POLONIAE
Vol. 50, nr 1—2: 161—164
1981

Endopolyploidy in the antipodals of *Ranunculus* subgenus *Batrachium*

KRYSTYNA TURAŁA-SZYBOWSKA, MARIA WĘDZONY

Department of Plant Cytology and Embryology, Institute of Botany, Jagellonian University, ul. Grodzka 52, 31-044 Kraków, Poland

Abstract

In three species of *Ranunculus* subgenus *Batrachium*, viz. *Ranunculus peltatus* Schrank., *R. penicillatus* (Dumort.) Bab. and *R. baudotii* Godr., differentiation of antipodals is connected with endomitotic polyploidisation. Calculations of nuclei volume and analysis of nuclei structure were performed in successive developmental stages. Nuclei of the antipodals attained different levels of endopolyploidy: 32n (*R. penicillatus*), 64n (*R. peltatus*) and 1024n (*R. baudotii*), as a maximum. In *R. peltatus* and *R. baudotii*, which reproduce sexually, the stimulating effect of fertilization on endomitotic polyploidisation of the antipodals was found. The occurrence of giant chromosomes in highly endopolyploid nuclei of the antipodals in *R. peltatus* and *baudotii* was noted.

Endopolyploid antipodals observed in some species of angiosperms represent an interesting object for cytological studies in view of two facts: the high levels of polyploidy and various structures of their nuclei, especially the frequent occurrence of polytene chromosomes (Tschermak-Woess, 1956; Hasitschka, 1956; Nagl, 1978).

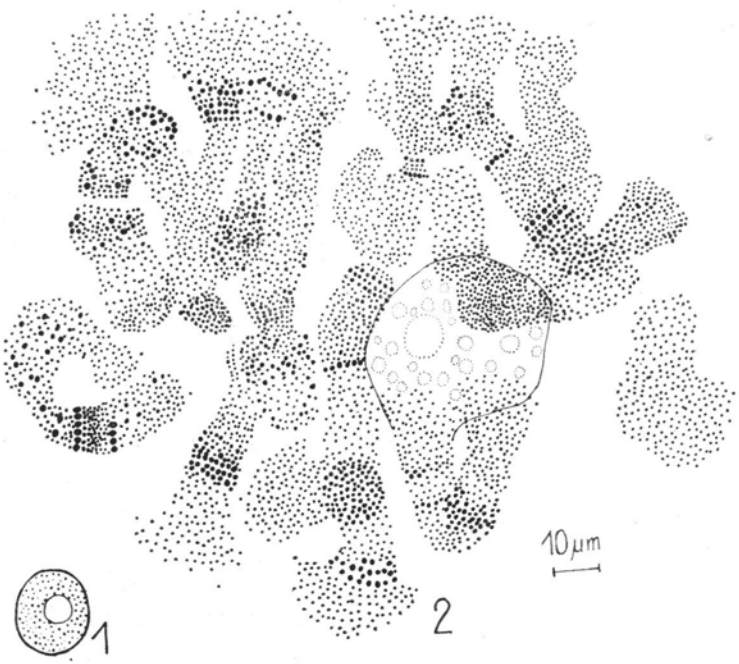
In genus *Ranunculus* subgenus *Batrachium* polyploid antipodals were observed by Cook (1963) and later described more precisely in *Ranunculus tripartitus* (Patel, Cook, 1972). These authors, however, defined exactly neither the attained degrees of polyploidy, nor the way of polyploidisation, although their description and drawings pointed to endomitosis.

The present study deals with the antipodal cells of three species of *Ranunculus; R. peltatus* Schrank. and *R. penicillatus* (Dumort.) Bab. were investigated by the first author, *R. baudotii* Godr. by the second. All species in Poland have the tetraploid chromosome number, 2n = 32 (Turała, 1973). The material from natural habitats was fixed in acetic alcohol (1 : 3). The antipodals were studied on microtome sections stained with Heidenhains hematoxylin or on acetocarmine squashes.

In the antipodals calculations of nuclei volume and analysis of their structure were performed in different developmental stages. The investigations revealed the occurrence of different levels of endopolyploidy amounting to 32n (*R. penicillatus*), 64n (*R. peltatus*) and 1024n (*R. baudotii*).

In *R. peltatus* and *R. baudotii*, which reproduce sexually, the differentiation of antipodals was investigated in relation to the developmental stages of the endosperm, in view of its differentiation prior to that of the embryo. A stimulating effect of fertilization on the rate of differentiation of the antipodals and their levels of endopolyploidy was found. In *R. penicillatus* the antipodals were studied in two self-incompatible populations (Turała-Szybowska, 1978); in one population only a few nuclei attained the level of 32n, as a maximum, whereas in the second population the antipodals remained on the haploid level. Accordingly, in seed sterile hybrid. *R. trichophyllus* ×*R. aquatilis*, studied previously (Turała, 1972), polyploidisation was not found in the antipodals. At the cellular stage of endosperm development the degeneration of the antipodals occurred.

Increase in size of the nuclei was accompanied by change in their structure. In the endopolyploid nuclei the occurrence of aggregations of chromatin enlarging in the course of endopolyploidisation was noted.



Figs 1-2. *Ranunculus baudotii* Godr. — haploid nucleus (1) and 256-ploid nucleus with polytene chromosomes (2) from the antipodals

In highly polyploid nuclei of *R. peltatus* and *R. baudotii* chromatin assumed the form of polytene chromosomes. The structure of the nuclei in successive stages of development was studied more thoroughly in the antipodals of *R. baudotii*. In this case a characteristic succession of the structures from the initial chromomeric, nearly homogenous one, through the aggregations of chromatin elements of different degrees of association to polytene chromosomes was noted (Figs 1, 2). The polytene chromosomes were the only structures observed in highly endopolyploid nuclei of the antipodals of this species.

The antipodals of genus *Ranunculus* subgenus *Batrachium* seem to be a convenient material for studies dealing with the part of endomitoses in the processes of differentiation of this tissue. Investigations appear to be particularly advisable as, despite the fact that the antipodals seem to have secretory and transfer character, their exact role in embryogenesis is not well known yet.

The more detailed results will be published separately.

REFERENCES

Cook C. D. K., 1963. Watsonia 5: 294-303.
Hasitschka G., 1956. Chromosoma 8: 87-113.
Nagl W., 1978. Endopolyploidy and polyteny in differentiation and evolution (North-Holland, Amsterdam), 283 pp.
Patel T. K., Cook C. D. K., 1972. Bot. Jb. 91: 438-461.
Tschermak-Woess E., 1956. Chromosoma 8: 114-134.
Turała K., 1972. Acta Biol. Crac. ser. Bot. 15: 191-203.
Turała K., 1973. Frag. Flor. et Geobot. 19: 291-304.
Turała-Szybowska K., 1978. Acta Biol. Crac. ser. Bot. 21: 9-21.